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POSSIBLE AGRICULTURAL DEVELOPMENT IN ALASKA.

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INTRODUCTION.

Two seasons were spent in the investigation of Alaskan agricultural possibilities. During the first season the south-coast area was studied. The second season's work included the Yukon drainage and points on the south coast, some of which had been visited on the former trip.

WHAT THE TOURISTS SEE ON THE SOUTH COAST.

The route from Seattle is by a winding, narrow course, over still waters, through archipelagos of mountain islands that front the mainland all the way from Puget Sound to Skagway. The 1,000-mile journey is a boat ride through mountain canyons. The mountains on both mainland and islands are snow capped, and coming from the snow fields are numerous waterfalls that are emphasized by the dark cloak of spruce that drapes the land from the water's edge to snow line.

The mountains increase in height and consequently in extent of snow fields toward the north. The tourist naturally concludes that this is the result of the higher latitude. After four or five days' travel northward glaciers are seen on the sides of the mountains. When near Juneau the steamer may turn from its course and run into Taku Inlet, to give the passengers a near view of a glacier that reaches tidewater and is discharging icebergs into the sea.

With many of the tourists Juneau, the capital of Alaska, or Skagway, 100 miles farther north and the end of navigation by this route, is as far as they go, possibly returning to Seattle on the same boat. If this is so, all they have seen of Alaska is a 400-mile stretch of channel between the forest-covered mountains that constitute the 100-mile wide strip of southeastern Alaska. If they go on to Seward, the end of the steamer run, with calls at Cordova and Valdez, traveling nearly 1,000 miles farther along the south coast of Alaska to the westward, they will see magnificent views of other mountains, glaciers, and illimitable fields of snow. The tourist has traveled nearly 2,000 miles from Seattle by this route, but he has seen only the narrow southeastern projection of the Territory and a small section of the south coast of the mainland. He has seen, however, what has given to the world the most commonly accepted opinion of Alaska. Erroneous as is the opinion thus developed of the Territory as a whole, it is the more remarkable that it is quite as far wrong respecting the portion that comes under observation, for, notwithstanding the prevalence and close proximity of the snow and ice fields on the south coast, the fact remains that this portion of the Territory has a comparatively mild climate. To get a clear understanding of how this can be and of Alaskan climatic conditions in general, a brief description of the physical features of Alaska will be in order and necessary to a consideration of the agricultural possibilities.

A glance at a map of North America will show that Alaska comprises the northwestern end of the continent. The Territory all lies west of longitude 141° W., excepting the narrow strip that extends from Mount St. Elias along the shore southeastward some 600 miles, the extreme southern point touching latitude 54° 40′ N. The long projection extending out from the southwestern coast, forming the Alaska Peninsula and the Aleutian Islands, goes so far to the southwest that the farthermost island, Attu, is in the longitude of New Zealand, 173° E. Exclusive of the southeastern and southwestern projections, Alaska lies between longitude 141° and 166° W. and latitude 60° and 70° 30′ N. The mainland is about 700 miles from north to south and 700 to 800 miles from east to west. The total area is about 600,000 square miles. This area is thrust out from the main continental land mass, so that it is surrounded on three sides by great bodies of salt water differing greatly in temperature. The Arctic Ocean is on the north, Bering Sea on the west, and the Pacific Ocean on the south. The waters of the first are very cold, of course, because of the drift from the polar region. This drift extending through the Bering Strait makes the Bering Sea also quite cold. The drift of warm water from the southern Pacific Ocean northeastward modifies quite markedly the temperatures along the south coast, just as it does all along the western coast of the United States. Quite different climatic effects are thus produced on their respective shores by these different bodies of water. How far these effects extend inland depends much upon the topography of the country.

THE MOUNTAIN SYSTEMS OF ALASKA.

Alaska is distinctively mountainous, with two well-defined systems, one fronting the Arctic Ocean on the north and the other the Pacific Ocean on the south. Between these systems is a great plateau that forms the drainage area of the Yukon River and is occupied by innumerable detached mountains and mountain masses. There are no extensive level plains and very little level land, this being limited to the alluvial bottom lands along the larger streams, notably the Yukon Flats.

The northern or Arctic mountain system, most clearly defined in the Endicott Range, is a continuation of the Rocky Mountains, the Continental Divide, which, continuing northwestward through Canada, reaches the northern coast of the continent near the boundary between Canada and Alaska, and then swinging sharply to the west extends across the northern portion of Alaska. The altitudes in this system within Alaska are not high, the maximum being not more than 6,000 feet, with the result that there is but a small perpetual snow and ice field. The northern slope toward the Arctic Ocean is a barren and for the most part unexplored wilderness. It is drained by a number of large rivers.

The Pacific mountain system, which fronts the south coast of Alaska, demands more attention, for it is not only that which has developed public opinion regarding Alaska, but it is the dominating physical factor. It is the extension of the Coast Range of the United States, with which the Sierra Nevada coalesces in northern California and continues northward through Oregon and Washington as the Cascade Mountains. North of Puget Sound the sea has broken into the mountain fastnesses along a 1,000-mile stretch until the St. Elias Range is reached, where, with increasing height, the sea is forced back outside of the coast line. Northwestward from Mount St. Elias the range widens into a system, with the Chugach and Kenai Mountains immediately on the coast, and back of these the Wrangell and Nutzotin Mountains. These, with the minor ranges, merge into the Alaskan Range that swings southwestward and continues out on the Alaska Peninsula as the Aleutian Range, the whole mass forming the arc of a great circle. The system, extending in width from the water's edge to 200 miles back from the coast, is of great altitude, the maximum being Mount McKinley, in the Alaskan Range, 20,464 feet. Mount St. Elias is 18,024 feet high, and Mount Blackburn, in the Wrangell Mountains, is 16,140 feet.

Right here in this mountain mass, occupying an area 200 by 400 miles in extent, is the dominating fact that always must be borne in mind when studying Alaska, namely, the effect on the moisture with which the warm air currents from the sea are laden. Striking the cold breasts of these high mountains, the moisture in the air is condensed and precipitated as snow on the high levels and as rain lower down, 90 inches being the average annual precipitation at Sitka, while at a number of points on the coast in southeastern Alaska

150 inches annually have been recorded. This heavy snowfall at the higher levels, accumulating through the ages and solidifying into ice, forms the great glaciers, and we have here on the south coast of Alaska in this 200 by 400 mile area, much of which lies plainly in sight from the decks of steamers, the most extensive permanent snow and ice field in the world, outside of the polar region. In fact, nearly all of the permanent snow fields and glaciers of Alaska are in this area, there being, strange as it may seem, comparatively few that lie wholly north of the Arctic Circle, even in the Arctic mountain system. At the shore line of this same south-coast snow and ice field, in sight of the great glaciers, the temperatures are so high in winter that zero is rarely reached. The winters at Sitka, Juneau, and other points in southeastern Alaska are never as cold as they are at Washington, D. C., though the mean annual temperatures are about the same, the summers on the Alaskan coast being cooler than those in Washington. But it does not follow that because the south coast has a mild climate the conditions are favorable for agriculture. The cool summers and excessive precipitation, with much cloudy weather, are distinctly unfavorable, excepting for the growth of grass, garden vegetables, and small fruits. Vegetation is slow in maturing, and the curing of hay and grain quite difficult; to which may be added the fact that land available for tillage is very limited because of the mountainous topography.

Two considerable drainage areas are on the seaward side of this Pacific mountain system, that of the Copper River, which heads in the Nutzotin and Wrangell Mountains, and that of the Susitna, which heads in the Alaskan Range. In the valley of the Chitina, which unites with the Copper River 100 miles back from the coast, and in the valley of the latter above that point, there are areas of possible tillable land in flats and benches along the streams. A few homesteads have been located in these areas. Because of the Chugach Mountains that lie between these areas and tidewater to the south, the precipitation is very much less than immediately on the coast and the extremes of temperature are greater, the summers being warmer and the winters much colder.

Passing westward into the Cook Inlet region, we find in the valley of the Susitna and that of the Matanuska, both of which streams flow into the Cook Inlet at the north end, and extending down the east and west shores of the inlet, particularly on the east shore, to the southern end of Kenai Peninsula, considerable areas of tillable land. On the east side, near Seward, at the head of Resurrection Bay and up the river of that name, is a limited area of tillable land with a number of good homesteads. There are other homesteads at Sunrise, Hope, Knik, Kenai, and other points in the Cook Inlet region.

Precipitation is much less at Seward than at the more eastern points on the south coast, and winter temperatures are lower; still, the climate is comparatively mild, so that the harbor is never icebound. To the west of the Kenai Mountains, which form the southwestern extension of the Chugach Mountains, the precipitation becomes much less and winter temperatures much lower.

The south portion of Alaska is a heavily timbered area, a natural result of the heavy precipitation and equable temperatures. The timber is largely spruce, with some hemlock, and groves of poplar on the alluvial bottoms. Proceeding southwestward along the Alaska Peninsula and adjacent islands, the timber decreases and disappears entirely beyond the north end of Kodiak Island. The islands and mainland are quite mountainous, level land being limited to narrow strips along the beaches and to the numerous coves that indent the shores. Grass in great variety and luxuriance clothes the land from water to snow line and makes this the best grazing area of Alaska. At Kodiak, on the island of the same name, is an experiment station of the Office of Experiment Stations, United States Department of Agriculture, maintained as an animal-husbandry station. A herd of Galloway cattle and a flock of sheep are kept. A number of private live-stock enterprises are being established on Kodiak and neighboring islands. The stock is grazed during the summer, and winter forage is provided mainly from the native grasses that are cut for hay and silage.

TOPOGRAPHY OF THE GREAT INTERIOR.

Having considered briefly the topography, climatic conditions, and agricultural features on the seaward side of the mountains that front the south Alaskan coast, let us proceed to the great interior plateau. In the winter time the route is overland from the south coast. From Seward one can go by rail 70 miles on the Alaska Northern Railroad, then by trail to Iditarod in the lower Yukon Valley. From Valdez a Government-built wagon road runs to Fairbanks on the Tanana; or, one can use the Copper River & Northwestern Railroad 135 miles from Cordova to Chitina and thence by Government trail to Fairbanks. The last is the winter mail route to the interior, and a regular stage service is maintained, there being stage stations at the end of each day's run. Notwithstanding the route is over the mountain ranges and very low temperatures are experienced, the trips are comfortably made.

Summer travel by team is not yet feasible by these routes, because of the wet and boggy condition of much of the land, due to the melting at the surface, with a frost line a few feet below that prevents the escape of the surplus water. So the summer route to the interior is by steamer from Seattle to St. Michael, at the mouth of the Yukon River, then up this stream on the river boats; or, from Seattle to Skagway on deep-water boats via the inside passage, from Skagway to White Horse, Yukon Territory, on the White Pass Railroad, 110 miles over the range, and then by Yukon River steamers. On the latter route 20 miles on the railroad carries one to the summit of the range that separates the coast from the interior and puts the traveler in the Yukon drainage area. White Horse is at the head of navigation on the Yukon, the White Horse Rapids being a bar to farther travel upstream. Downstream it is 560 miles to where the river crosses the international boundary near Eagle, Alaska, about 125 miles south of the Arctic Circle, and it is 1,500 miles from Eagle to St. Michael. The Yukon, with its tributaries, has nearly 4,000 miles of navigable water. It is the fifth in size of the rivers of North America, and it drains an area of 200,000 square miles.

The great interior of Alaska is essentially a mountainous area, although the mountains between the Endicott Range on the north and the Alaskan Range on the south are more or less detached and of quite moderate altitude.

Level areas in the interior are for the most part limited to the alluvial bottoms along the streams. The most pronounced exception to this is in the Yukon Flats. About 200 miles downstream from Eagle the river passes into an area 150 miles long and 50 to 75 miles wide that is quite level. The river banks are low and the stream divides into innumerable channels, thus forming a myriad of islands. Dense growths of spruce and poplar occupy the land, with occasional grass meadows. For the most part the bottom lands comprise a strip on one or both banks of the larger streams, rarely exceeding a couple of miles in width. Next to the bottoms there may be benches which merge into low hills, and these into the mountains that make up the larger proportion of the area. The bottom, bench, and low hill lands are, of course, those that are suitable for farming, the higher hills and mountains being more or less available for grazing.

The low hills having a southern exposure, and particularly if covered with a growth of birch, are the best suited to tillage. The benches with comparatively high banks above the streams and free from gravel banks are the next best. The low-lying bottom lands, lacking both water and air drainage, are the least desirable for farming purposes.

The largest area of tillable land thus far located in the interior is in the Tanana Valley, extending 20 to 30 miles above Fairbanks and downstream to the junction of the Tanana with the Yukon. The Kuskokwim River, which rises on the northwestern slope of the Alaskan Range and flows southwest into Bering Sea, occupies a great and little-explored region, and it is quite possible that there are large tillable areas in its valley.

Small areas of land for gardens may be found even above the Arctic Circle along the Koyukuk, Chandalar, and other Yukon tributaries that come in from the north. The Kobuk River, which empties into Kotzebue Sound above Seward Peninsula and lies wholly above the Arctic Circle, is said to offer some farming and gardening possibilities.

CLIMATE OF THE INTERIOR.

Climatic conditions of the interior are determined by the latitude and its relation to the bodies of water and mountain systems already mentioned. Much of the area of the interior, particularly the Tanana Valley and the upper Yukon Valley in Alaska, lies north of latitude 64° N., and extends above the Arctic Circle. Cut off from the tempering influence of the warm waters of the Pacific that have so much effect at the coast, both with reference to temperature and precipitation, the result is light precipitation, short but quite warm summers, and long, cold winters. It must be remembered that, while the summers are short in number of days, there are 18 to 20 hours of sunshine daily during the growing season, and that this, with comparatively high temperature, causes very rapid growth of vegetation. The lower Yukon and Kuskokwim region is in a lower latitude, but this is counteracted by proximity to the cold waters of Bering Sea, with no protecting mountain range to arrest the cold air currents.

As a result of the long winters, and, generally speaking, low temperatures, during which the ground is deeply frozen, and the short summers, there is frozen earth even in the summer time within a few feet of the surface over much of Alaska. Because of this frost line the moisture from the melted snow on the ground and the frost in it can not drain away and can escape only by evaporation. This condition of slow melting and evaporation is emphasized by the vegetable growth and particularly the moss, which is a most efficient nonconductor of heat as well as an excellent sponge for holding moisture.

Over much of Alaska during the summer there is, then, a thin stratum of saturated earth with its protecting coat of moss or other vegetation, forming for the most part a morass impassable for wheeled vehicles and almost impassable for horses. Land travel by teams is therefore practically out of the question in Alaska during the summer, even where the mountains and timber growth do not interfere. But with a coast line of 26,000 miles and 6,000 miles of navigable rivers, one of which, the Yukon, bisects the territory with a 1,500-mile waterway, Alaska is marvelously well supplied with facilities for water travel during the summer season. But as the streams are icebound from early in October until June and only the harbors on the south coast are ice-free during the winter, the dog team and sled are still the most general and widely used mode of conveyance in winter, although horses are being used more and more during this season on established lines of travel.

VEGETATION.

Mention has been made of the heavy timber growth on the south coast, largely of spruce, with some hemlock and areas of poplar on some of the alluvial bottoms. In the Susitna Valley there are extensive belts of poplar, some of which is good saw timber.

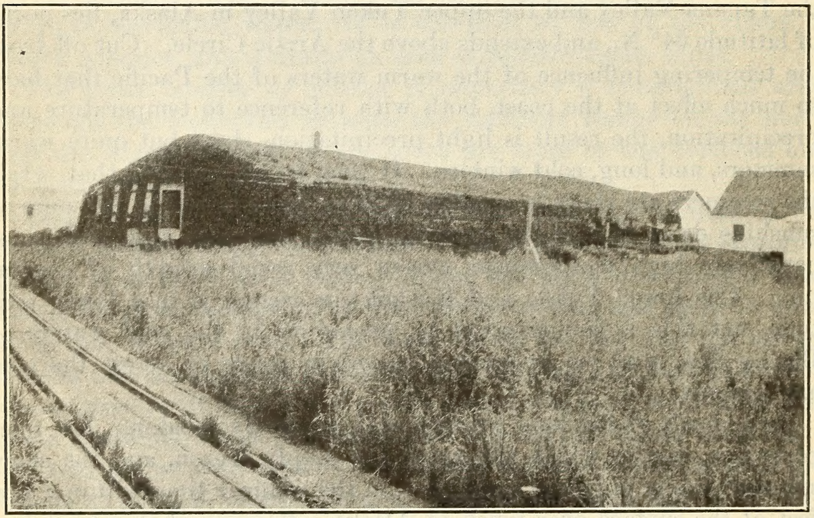

FIG. 1.—Native grass and tundra-sod ice house, St. Michael, Alaska, July 29, 1911.

Practically all of the interior that comes within our purview as possessing agricultural possibilities is timbered, but for the most part the growth is small and thin. Spruce is the most prevalent. There are belts of balm of Gilead poplar at the lower levels and quaking aspen nearer the snow line. Birch groves occupy many of the benches and low hills adjacent to the river bottoms. If not destroyed by fire and undue waste, there is enough timber in the interior to meet the needs of a largely increased population.

Grasses in great variety are native to Alaska (fig. 1) and are widely disseminated, many of them being of large agricultural value for hay and silage and for grazing. Wherever the timber is destroyed by fire or cut away, grasses at once spring up and make a luxuriant growth.

Other native vegetation of agricultural economic value includes a considerable variety of wild fruit—salmon berries, red and black currants, gooseberries, cranberries, blueberries, and other edible small fruits that are found in plentiful quantities over wide areas.

The most widespread forms of plant life in Alaska are the mosses and lichens, and they claim attention both for their agricultural value and because they are also an obstacle to agricultural development. One of the lichens known as reindeer moss (*Cladonia rangiferina*) grows widely in the western half of Alaska and in all that portion north of the Yukon. It is the principal winter food of the domesticated reindeer.

Reference has been made to the water and frost holding characteristics of the moss growth. It is this that makes the moss an impediment to agricultural development in sections where tillage is feasible. It appears to decay very slowly, as is the case to a certain extent with all vegetable matter in localities where there are but brief periods of warm weather, so that a coat of moss varying in thickness from a few inches to a number of feet accumulates over much of the land surface. Even in those portions of Alaska where the winters are comparatively mild, but the summers cool and moist, the frost will be so near the surface under a coat of moss that at any time during the summer a cane may be thrust through the moss to the frost line. Under these wet and cold conditions and the slow decay of the vegetation the soil is quite acid, as is evidenced by much of the plant growth, the species being those that grow on land that is too sour for most farm crops. When the timber and other plant growth, including the moss, is removed from the land, thus giving the heat of the sun and the air a chance to penetrate the soil and dry out the moisture, the frost line goes lower each season until it ceases to be an injurious factor, and in the meantime the acidity of the soil grows less.

THE SOILS OF ALASKA.

Alaskan soils have their origin largely in material formed by glacial action. They are not very rich in available plant food, as a rule. The vegetable matter that has accumulated on the surface is in such a partially decayed and acid condition that it is quite apt to be injurious to some cultivated plants. This is quite pronounced even in the regions of mild temperatures and abundant rainfall, as in southeastern Alaska, where vegetation is luxuriant and the soil is apt to be quite peaty and mucky. In fact, extensive beds of peat exist in various portions of Alaska. Wherever there has been sufficient drainage and the vegetable matter has fully decayed there is a rich black loam of varying depths; but these areas are limited to small valleys, some of which are the dried-up beds of former shallow lakes. The alluvial deposits along the larger streams contain good soil, but there are many gravel beds that have only a thin covering of fertile soil. Much of the soil, particularly of the benches and low hills, is composed largely of material deposited by the melting of the ice sheet that formerly covered the land.

Drainage is an important and widespread need in Alaskan agriculture, not merely in the southeastern section where the rainfall is so abundant, but in the interior where the precipitation is so light that irrigation is thought by some to be a possible essential. Wherever the soil is at all peaty, from the accumulation of partly decayed vegetable matter, drainage will greatly improve the condition. Shallow lakes and partially dried lake beds abound, and the draining of these will make available for tillage much good land and will be otherwise beneficial. It is noticed that wherever the tundra moss is disturbed in such a way that drainage has resulted incidentally, as has been done at St. Michael in connection with building operations, grasses come in and make a luxuriant growth.

Notwithstanding the need of drainage, even in the interior, as has been stated, some of the settlers are of the opinion that irrigation will be necessary in certain localities, and a few have installed irrigation systems. It is not probable, however, that irrigation will be a general or pressing need. The ground is usually frozen to a great depth during the long and severe winters and, of course, thaws quite slowly after the frost line has fallen a foot or so. So long as there is frost in the ground drainage will be retarded, and as the frost slowly melts it will supply moisture by capillarity to the surface soil. The shortness of the growing season and the tendency of vegetation to rapid growth and early maturity under the influence of the almost continuous sunlight will lessen the need of irrigation.

POSSIBLE AGRICULTURAL AREAS.

So far as topography, soil, and climate determine the matter, Alaska has probably 100,000 square miles of area on which there are possibilities for farming and grazing. The larger portion of the farming land is in the interior, in the Yukon drainage. Notwithstanding the mildness of the climate and the accessibility of the south coast, the precipitous topography to the water's edge makes tillable land very limited, particularly in the southeastern section, where the excessive precipitation and much cloudy weather are also agricultural handicaps. Of tillable land contiguous to the south coast from southeastern to southwestern Alaska, probably not more than 1,000 square miles are available. In the Copper River drainage, 100 miles back from the coast, there are possibly 2,000 square miles of such land, and not less than 3,000 square miles in the Cook Inlet region, including the Matanuska and Susitna drainage areas. It is estimated that there are 8,000 square miles of tillable land in the Tanana Valley and possibly twice that area in other portions of the Yukon drainage, much of this being in the Yukon Flats.

IS FARMING FEASIBLE IN ALASKA?

It is hardly necessary to prove that agriculture is feasible in Alaska other than by citing examples of successful gardening, farming, and stock raising at widely separated points. First in importance is the agricultural experiment station work of the United States Department of Agriculture that has been carried on by the Office of Experiment Stations for 15 years. There are four of these stations; one at Sitka, the headquarters station, in southeastern Alaska; one at Kodiak, in the southwestern portion; and two in the interior, one of which is at Fairbanks on the Tanana and one at Rampart on the Yukon, the latter being within 75 miles of the Arctic Circle. Stations were successfully maintained for a few years at Copper Center, in the Copper River Valley, 100 miles from the coast, and at Kenai, on the eastern shore of Cook Inlet.

At the Sitka station much work has been done in the testing of varieties of potatoes and other vegetables, making fertilizer experiments, and in the hybridizing of fruits. In this last work some very promising results have been obtained in crossing the native strawberry with cultivated sorts. The Fairbanks station is being conducted largely as a demonstration of the feasibility of farming as a business. At Rampart much attention is given to the testing and breeding of varieties of grains suited to the climate. Varieties of wheat, oats, rye, and barley, and of potatoes and many other vegetables have matured every season since the work started at these two most northern stations. The Kodiak station is devoted to animal-husbandry work, and an effort is being made to develop dairy cattle suitable to Alaskan conditions by selection and breeding from the herd of Galloway cattle now at the station. Sheep husbandry is also being given attention.

Successful home and market gardens are found at numerous points in southeastern Alaska—Juneau, Haines, Skagway, and Seward; in the Cook Inlet region (fig. 2); and all along the Yukon and Tanana. Some of the more hardy vegetables are grown in favorable localities far above the Arctic Circle, on the Chandalar, Koyukuk, and other streams. A successful cattle raiser is located on a homestead near Juneau; a homesteader at Circle, on the Yukon, is establishing a herd and building silos and barns; and there are good dairies at Juneau, Skagway, Fairbanks, and Nome.

EXAMPLES NEAR THE COAST.

That it is feasible to grow forage crops at Kodiak has been demonstrated, and potatoes and other garden vegetables are successfully grown. Mr. M. D. Snodgrass, superintendent of the Agricultural Experiment Station at Kodiak, is proving the feasibility of raising chickens and, besides supplying a local demand, is sending occasional shipments of eggs and chickens by steamer to other south-coast points.

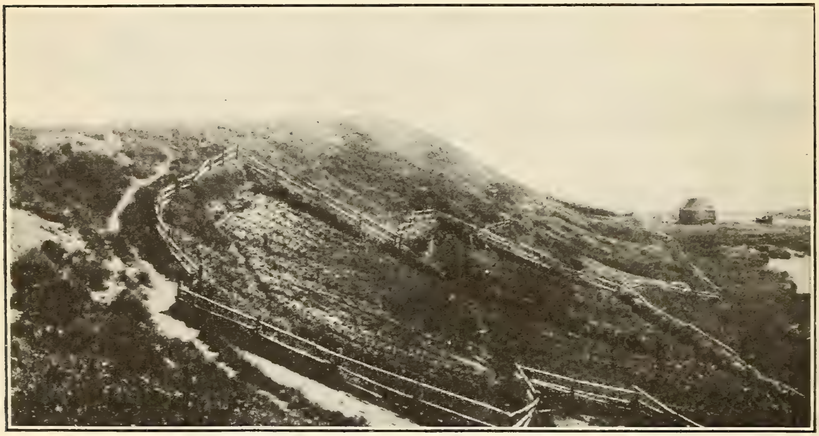

FIG. 2.—Gardens on the south slope facing Cook Inlet, Kenai, Alaska.

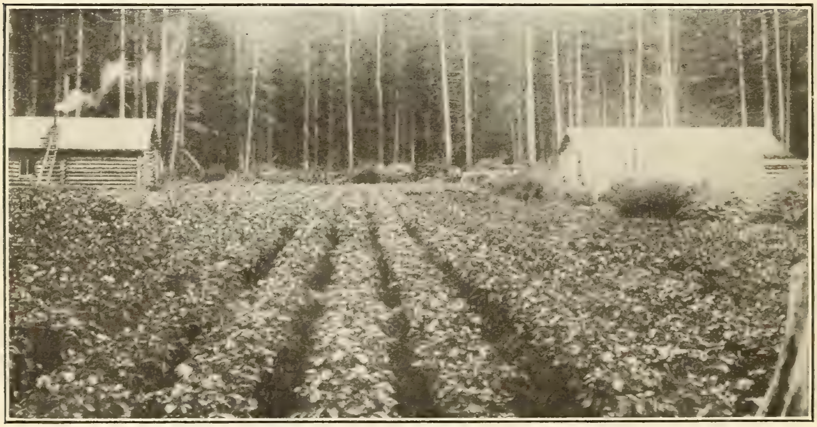

FIG. 3.—Otto Bergstrom's potato field on cut-over timber land, Seward, Alaska, August, 1910.

Near Seward, on Resurrection Bay, the tidewater terminus of the Alaska Northern Railroad, a number of farmers are located, among whom are Ole Martin, Otto Bergstrom (fig. 3), and W. A. McPherson. These men have abundantly demonstrated that the climate and soil in this locality will permit a considerable agricultural development. Limited markets and lack of a wagon road connecting the farms with the town have been the chief difficulties. Ole Martin keeps chickens and says they do well. Mr. McPherson writes under date of July 8, 1912:

> We have the wagon road to Seward and are making a little more headway with our farms, for we are using horses now. The road is very useful, but is not yet ready for wheels. We had a very early spring this year and started our gardens in April. Our crops are looking splendid. The Alaska weather seems to have changed very much, and the change is for the good of the gardens, so we will have good crops this year, but the market will be very poor, because so many people are leaving Seward until the times get better. * * * Two or three new homesteads have been located at Kenai Lake within the past year. Otto Bergstrom, Ole Martin, Mr. Nash, and I have made quite a little more improvement on our homesteads since last fall. We all broke a little more land.

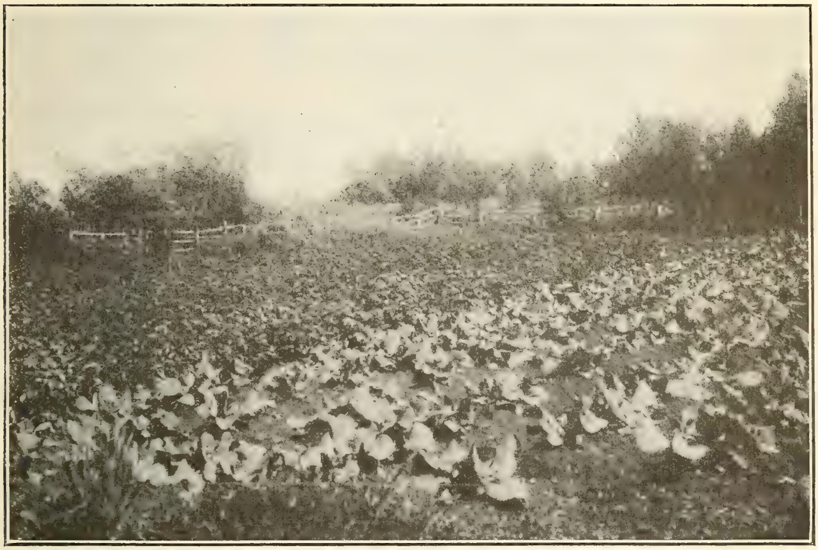

FIG. 4.—Garden of cabbage and potatoes, Knik, Alaska, August, 1909.

About 100 miles north of Seward, at the head of Cook Inlet, is another group of homesteaders near the town of Knik (fig. 4). Others are located at Sunrise and Hope, on Turnagain Arm. Knik may be reached by ocean steamer from Seattle, or from Seward over the 70 miles of track of the Alaska Northern Railroad to Kern Creek, and from that point by gasoline launch through Turnagain and Knik Arms. When extended into the Matanuska coal field and to the interior, the railroad will pass through the Knik region. The agricultural possibilities of the region are indicated in part by the following statements contained in a letter dated June 26, 1912, from Hiram W. Mitchell, a homesteader near Knik:

> The following figures showing last season's agricultural productions in the Knik neighborhood are based on estimates, but I think they are accurate:

Potatoes, 8 tons, at $100 per ton	$800
Cabbage, 2½ tons	250
Rutabagas, beets, carrots, turnips, etc., 2 tons	200
Other products in small gardens, about	100
Oat and barley hay, 3 tons, at $75 per ton as compared with outside hay	225
Native hay, 50 tons, some used by producer and some sold, generally valued at $40 per ton, but compared with outside hay at $25	1,250
Total	2,825

> The present price for potatoes and garden truck is 5 cents per pound.
>
> In connection with the foregoing figures, the following estimates are made by Mr. O. G. Herning and myself as to farm products that are shipped in by the merchants and which might have been produced here:

Pork, bacon, and ham	$4,000
Eggs	2,000
Lard	1,500
Potatoes, 12 tons at $70	840
Butter	2,000
Milk, evaporated	1,200
Same class of goods brought in by mining companies, estimated	5,000
Pressed hay, 200 tons at $60	1,200
Oats for horses	8,000
Total	25,740

> These estimates are based on what the goods cost the storekeeper and miners delivered at Knik. Adding the value of the products grown by the homesteader, $2,825, we have a total of $28,565.
>
> It shows that there was a market here for nearly or quite $30,000 worth of farm products, all of which might have been grown here. In short, it means that 30 homesteaders could each have sold $1,000 worth of produce for home consumption. Of course, to have secured these $30,000 it would have been necessary to have had horses, cows, hogs, hens, and tools. There is not at present a cow or hog here and only 40 or 50 hens in this whole big region. There is not a real farm here. * * *
>
> There is no doubt that oats and barley will grow well here, both for hay and grain, and I don't see why we can not produce meat, pork, beef, and mutton for this country and to send to Seattle, too. Here is a great big country from the mouth of the Matanuska River clear across to the Susitna, partly surveyed. If cleaned up and settled on, I believe the stream of bacon, beef, eggs, milk, butter, etc., could be turned around and made to flow to the "outside" instead of from there here. Farm machinery can be used here. With brains, grit, and perseverance, farmers can do as well here as elsewhere, and they are needed.

Proceeding eastward along the south coast to Cordova, the tidewater terminus of the Copper River & Northwestern Railroad, and northward on this road 131 miles, we come to the mouth of the Chitina, the largest affluent of the Copper River. The railroad, which ultimately will be continued on up the Copper River to the interior, now turns eastward up the north bank of the Chitina to the Bonanza copper mine, 196 miles from the dock at Cordova. From the mouth of the Chitina the road lies on a bench with banks quite high above the river. This bench is 50 to 60 miles long and averages from 5 to 6 miles in width to where the high mountains lying to the northward develop. This bench, with its southern exposure, has conditions quite favorable for farming. The district also has the advantage of being connected by rail with regular steamers at Cordova and of being contiguous to the rich copper and other mineral fields that will soon afford good markets for farm products.

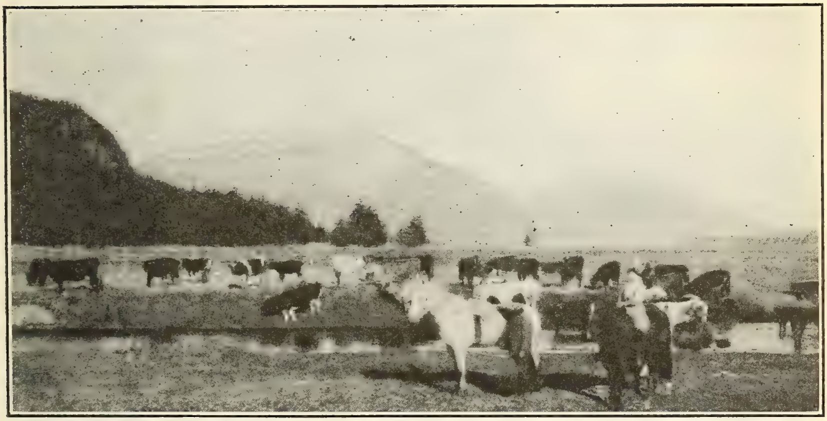

FIG. 5.—Thomas Knudson's dairy herd and homestead, 10 miles from Juneau, Alaska, May 23, 1911.

A number of homesteads have been located on the bench mentioned. The locator of one of these, George W. Wolfe, writes, on February 25, 1912, as follows:

> I have now on my place about 12 acres cleared and plowed and ready to put under cultivation. I believe that I told you irrigation would be necessary in this section, and to meet this need have dug an irrigation ditch about one-half mile in length, but cold weather coming on, I could not finish this, and it will probably take a month for two men in the spring to put it in condition to carry water. Furthermore, as I had my team to take care of during the winter, I got out enough logs and timber to do for all necessary buildings. You are probably aware that it is no small undertaking for anybody to cultivate land in Alaska, or elsewhere, unless he has ample means to see himself through for a couple of years. I am solely dependent on what I can earn during the few months of winter, which is not enough to keep me going during the summer. This seems to be the only drawback that I know of to farming here. Last fall

I bought a team of horses to do my plowing, expecting that I would get something for the team to do during the winter, even if only enough for horse feed, but was compelled to sell them about a week ago for half what I had paid, as I couldn't get work for them to do. Horse feed at $70 a ton will soon eat up a team. I do not know that I will be able to accomplish very much on my place this summer, as I am practically out of funds and am compelled to get work elsewhere to earn a little money. By that time the season will be far advanced, and it will probably be too far to get in any crop at the right time.

Juneau, the capital, although located on rather than at the foot of the mountains, has many private flower and vegetable gardens, a number of market gardens, and a dairy of 10 to 15 cows. Twelve to fifteen miles out from the town there is a group of homesteads. On one of these homesteads Mr. Thomas Knudson (fig. 5) maintains a herd of 50 cattle and sells 30 to 40 pounds of butter weekly in Juneau, where he also sells his surplus cattle as dressed beef. He uses a separator and has a silo. Silage made from the native grass forms a considerable part of his stock forage.

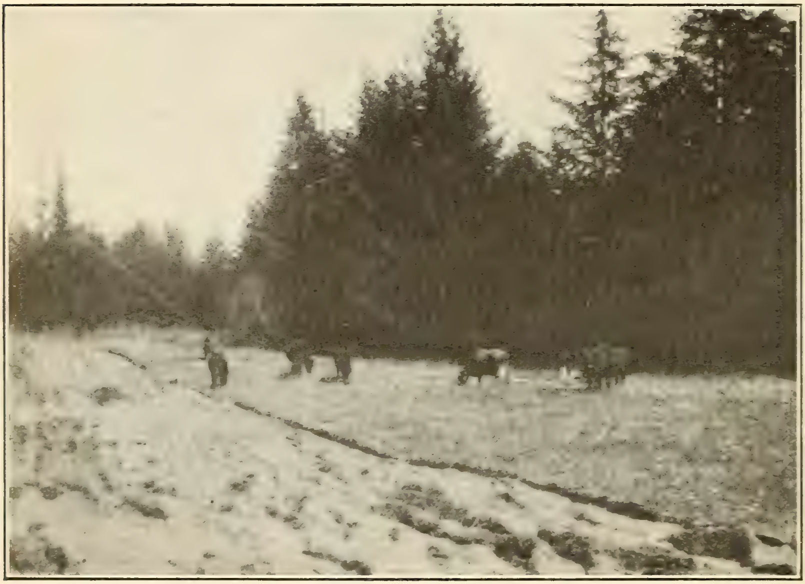

FIG. 6.—Native-grass sward, showing first breaking and Jerseys grazing, J. J. Rath's farm, Haines, Alaska, May 29, 1911.

Haines, Alaska, is 100 miles north of Juneau and near the end of the 1,000-mile "inside route" from Seattle. There are five or six homesteaders near the towns, who are helping to prove the feasibility of farming in Alaska.

Henry Andes writes on June 18, 1912:

My crop last year was fine. I put in about one-half of my garden to potatoes and got 65 sacks, at the rate of about 500 bushels to the acre. My sawmill, all the lumber, and 200,000 feet of logs burned. * * * The heat from the fire blighted my apples so only two ripened, but this year the trees are loaded with green fruit. I will let you know in the fall how it came out. We had the army worms here this year. They took all my cabbage and a great many other things; but they have disappeared now, and everything is looking fine. I had to replant twice.

J. J. Rath began late in the season of 1910 to improve his homestead (fig. 6). He writes under date of June 18, 1912:

> The outlook for this season's crop is very favorable. Spring was about three weeks earlier than in 1911.[1] I sowed field peas and barley together on a gravelly soil. They look well. Japanese millet on a clay soil where buckwheat was grown last season is looking fair. Brome-grass is fair to middling; oats are good. We had a light frost on the 11th instant that shriveled some of the top leaves of the devil's-club.

Skagway, Alaska, is a few miles beyond Haines. It is the end of deep-sea navigation by the " inside route " and the tidewater terminus of the White Pass Railroad. H. D. Clark is an extensive and successful market gardener here. One of his specialties is a half acre of rhubarb, from which shipments are made to Juneau, Dawson, British Columbia, and other points. Chickens, ducks, and geese are kept and make good returns. Oats are grown for hay, and hay is made of native grass. Mr. Clark's neighbor keeps a dairy of 20 cows.

EXAMPLES IN THE INTERIOR.

The interior may be reached by the White Pass and Yukon River route, which is by train from Skagway to White Horse, British Columbia, and by steamer down the Yukon River about 600 miles through British territory to Eagle, Alaska, near the international boundary and 125 miles south of the Arctic Circle.

Clyde H. Thompson writes from Eagle, under date of May 13, 1912:

> My chickens stood the winter fine. They laid a little during most of the winter, and are now shelling out eggs. I get 20 to 30 a day and sell at $1.50 a dozen. I have 40 hens, including 15 or 20 old hens, which bring the egg average down. Will have chicks out in about 10 days. My cow came in a little early this year for grass, about March 30. Feed is good now. * * * We had the best garden here last year we have ever had. Potatoes were as good as any I ever saw. I have put in some Russian wheat and Danish oats this year.

The potato crop at Eagle in 1910 was about 15 tons, grown in small patches in individual gardens. Most of these, together with several tons of oat hay, were shipped to Fairbanks.

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[1] The spring of 1911 was two weeks late.—L. C.

P. Lundeen has a 320-acre homestead across the river from Eagle. He writes, under date of July 26, 1912:

> Although last season was unusually dry, I raised a fair crop of garden truck, such as cabbage, carrots, lettuce, peas, radishes, and turnips, but was unable to dispose of any of it, as the town of Eagle is now almost deserted since the abandonment of the Army post; and the freight rates to more flourishing towns farther down the river are so high that they are positively prohibitive. The merchants at Fairbanks, Tanana, Ruby, Iditarod, and other points can obtain special contract rates from the steamboat companies, which enable them to lay down all farm and garden products from the States cheaper than they can handle the Alaskan products. Until the matter of excessive local freight charges is remedied farming at a profit will be out of the question. We have had an abundance of rain so far this season, and my crops bid fair to excel anything I have had since I have been in this country.

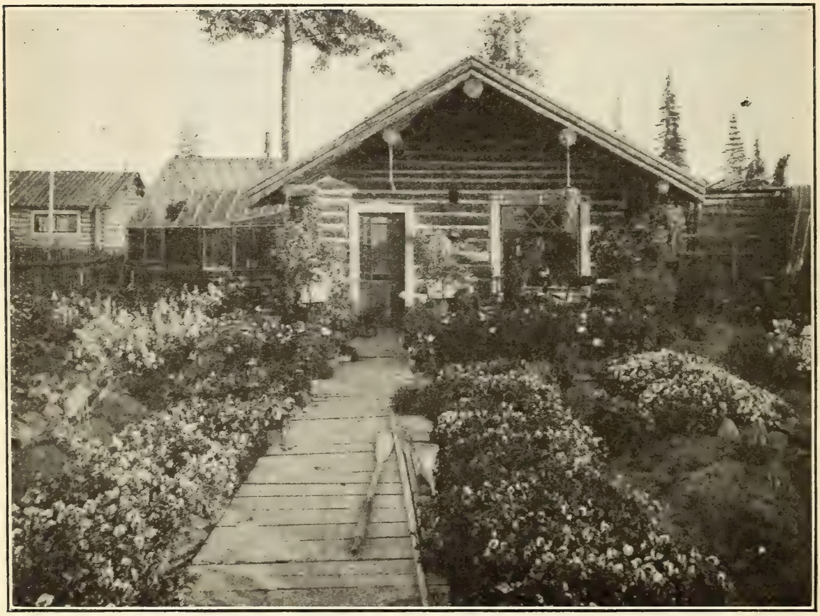

FIG. 7.—Home and flower garden in Fairbanks, Alaska. (Photographed by Huey.)

Circle is 100 miles or more downstream from Eagle, and within 50 miles of the Arctic Circle. Nels Rasmussen has a 20-acre field adjoining the town devoted mainly to the raising of oat hay for his freighting teams. C. R. Rieger has a homestead a few miles out of town, on which he has a herd of cattle and a silo.

At Tanana, which is at the confluence of the Yukon River and the Tanana, John Kehoe is growing a wide range of crops on his homestead.

Mention of Mr. Kehoe's method of getting rid of the moss and putting the land in condition for cropping will indicate one of the difficulties of opening up an Alaskan farm.

Generally speaking, it is necessary to clear the land of the timber growth and then remove the coat of moss. The timber growth is heavy on the south coast and smaller in the interior, but is often in dense thickets. Present experience does not favor plowing the moss under, as it seems to decay very slowly and it contains properties that appear to be injurious to ordinary farm crops. If it can be destroyed by burning on the ground the effect is beneficial. Mr. Kehoe accomplishes this quite effectively by rigging a standing cutter to a plowbeam, cutting the field in narrow strips, and then plowing a thin furrow slice. After it has lain awhile in this condition to dry, fire will smoulder its way through the loosened layer of moss and semipeat and leave a sprinkling of ashes that is beneficial to the land.

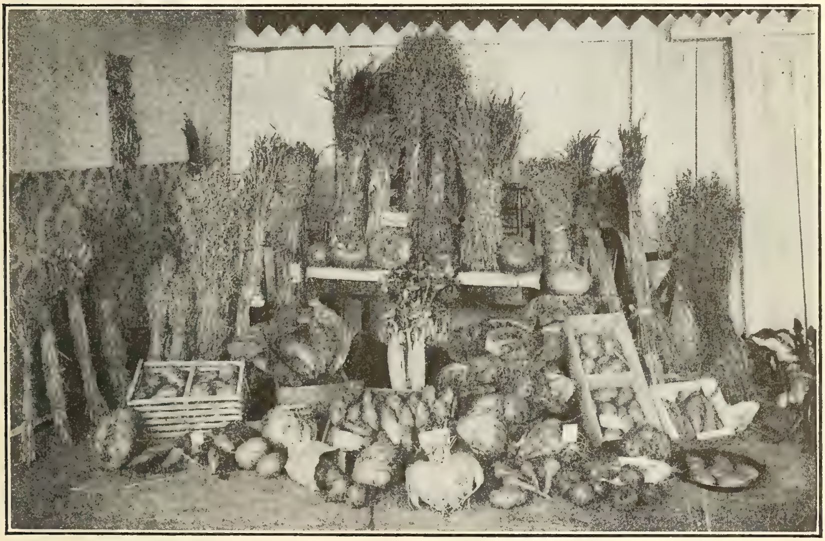

FIG. 8.—Tanana Valley agricultural exhibit at Fairbanks, Alaska, September 24, 1909. (Photographed by Huey.)

The Tanana Valley, extending from the mouth of the Tanana upstream 200 miles as the crow flies, contains the largest area of available tillable land to be found in any one locality in Alaska. Within this area is Fairbanks (figs. 7, 8, and 9), the largest town in the Territory and the center of the greatest mining activity, which is principally placer gold mining. Consequently there is here the best local market for farm produce of any place in Alaska. Market gardeners, dairymen, poultry keepers, and general farmers are prospering in the immediate vicinity of Fairbanks. At Hot Springs, midway between Fairbanks and Tanana, large quantities of vegetables are grown on J. F. Karshner's homestead by taking advantage of soil warmed by the hot springs, and also by utilizing the water for heating extensive greenhouses.

Twelve miles out from Fairbanks, on the Government wagon road leading to Valdez, on the south coast, is the Byler homestead and stage station, which was visited by the writer July 9, 1911. Since then Jonathan Byler has sold the property. In a letter dated May 23, 1912, he writes:

> It is not true, as has been reported to you, that the damage was great to my crops by frost. There was a very light frost about August 20 that nipped the tops of potato vines, after the bloom was dead, but it did not hurt the potatoes. You saw the crops growing when you were there last July and the land that was cleared and in cultivation, about 4 acres. One acre was in oats that grew about 4 feet tall, heavy on the ground and fully matured, and as good as any new ground would produce anywhere in the United States. From the remainder of the ground, about 3 acres, I sold produce as follows:

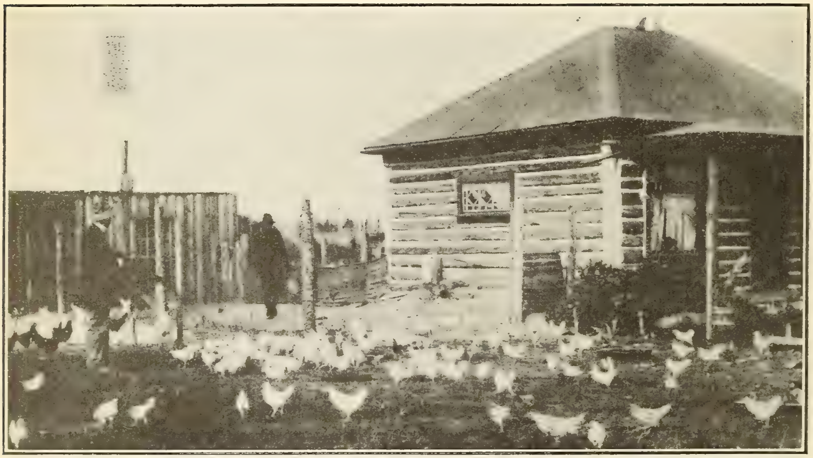

FIG. 9.—Mrs. J. P. Anderson's chicken yard, Fairbanks, Alaska, 1910.

Potatoes, 13½ tons, at 7 cents per pound	$1,890
Cabbage, 1 ton, at 6 cents per pound	120
Cauliflower, 200 pounds, at 5 cents per pound	10
Carrots, 300 pounds, at 3 cents per pound	9
Parsnips, 100 pounds, at 3 cents per pound	3
Turnips and rutabagas, 500 pounds, at 2 cents per pound	10
Onions, 70 pounds	5
Total received	2,047
The oats as hay,[1] about 3 tons, worth $60 per ton	180
	2,237

> This shows how much the frost damaged me in Alaska, and there are many others that did equally as well, and I think some did better.

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[1] This hay went with the place, which I have sold.

The only assistance the Alaskan farmer needs is to furnish him with the hardier varieties of everything that is adapted to a northern country, and any man who is a practical farmer can not help but make money farming in Alaska. This is my opinion and experience from 14 years here.

The Salchaket Trading Post is about 50 miles up the Tanana from Fairbanks. W. F. Munson, the proprietor, writes from that point on July 16, 1912:

I raised last year, successfully, cabbage, beets, potatoes, turnips, parsnips, rutabagas, rhubarb, carrots, celery, peas, cauliflower, green tomatoes for pickling, cucumbers, and kohl-rabi, all raised out of doors, and could have raised many more varieties, but did not have the seed. I sold very little, as we use the produce in the road house and have many animals to feed, such as pigs, cows, chickens, horses, and a young bull moose. It takes quite a lot of feed for the stock. Grain hay is also very successfully raised here, but does not mature in all places. The difficulties here are transportation and unreliable seed.

The foregoing letters from settlers are geographically representative of the localities in Alaska in which farming is feasible, but they are to be understood as giving only glimpses of the entire range of the conditions and farming possibilities.

GRAIN RAISING IN ALASKA.

Wheat, rye, barley, and oats are grown and ripened practically every year at the two agricultural experiment stations, maintained by the Office of Experiment Stations, at Fairbanks on the Tanana and at Rampart on the Yukon. Noting the fact that the latter station is only 75 miles from the Arctic Circle it might readily be assumed that if the grains are ripened there grain growing could be successfully undertaken throughout a considerable portion of the Yukon drainage and even more certainly so in the more southerly areas that have been mentioned as having agricultural possibilities.

It has already been stated in this paper that the best land for farming is that which lies on the south slope of the low hills, just back of the benches and bottoms that lie along the streams. This indicates that the good tillable land will be found in comparatively small and isolated tracts, a condition that is not favorable to commercial grain growing by modern methods. Unquestionably, small grain can be grown and matured over a wide area in the interior, but it is quite doubtful if it can be done with profit at the present time other than for stock-food purposes. Even with the heavy freight charges from the States to points in interior Alaska, flour from the States can probably be had for less money than would be required to produce the wheat on Alaska farms and mill it in the Territory under the scale of wages now prevailing in Alaska. In this connection it is to be remembered that the Puget Sound ports are close to a great wheatproducing region, and from these ports there is water transportation to Alaska. For the present, and probably for a number of years to come, small grain crops will be more profitably grown for stock forage, either cut green for hay or silage or ripened, than for grain to be milled into flour.

In southeastern Alaska, lack of clear weather will prevent the proper ripening of grain or curing of hay, even if level land were available for growing such crops on a commercial scale.

The bench on the north bank of the Chitina, with its southern exposure, is perhaps the most favored portion of the Copper River drainage for grain growing. The Knik district is the best so far tested in the Cook Inlet region. While the United States Agricultural Experiment Station was maintained at Kenai, on the west side of Kenai Peninsula, grains were grown at the station, but not always without damage by frost. A large area of land on the west side of the peninsula is available for grain and other lines of farming so far as quality of soil and topography would determine. The Susitna Valley contains a great area of land now covered with spruce and poplar forests, which if cleared and dried out would be available for tillage crops and probably grains, but no investigation has been made as to the prevalence of permanently frozen ground under the present growth of vegetation or to what extent the frost line will lower when the land is cleared.

THE REINDEER INDUSTRY OF ALASKA.

The reindeer industry is by far the largest agricultural proposition in Alaska at this time and it is calling insistently for consideration. The native caribou, or wild reindeer, still exist in large migratory herds on the Arctic Slope, in the Yukon drainage, and in the Alaskan Mountains. These animals are unquestionably of large economic importance to Alaska, and more stringent Government measures should be taken to prevent their rapid destruction, that they may be used as a basis upon which to build a great industry.

Dr. David E. Lantz, in Bulletin 36, Biological Survey, United States Department of Agriculture, speaks of several species and local races of the caribou, or reindeer, that inhabit the northern part of North America. These he divides into two groups according to habitat. The more northern group, which ranges beyond the forests, is represented by the barren-ground caribou (*Rangifer arcticus*). The second group inhabits the forested area south of the other, and is represented by the woodland caribou (*Rangifer caribou*). They differ but little in habits and general appearance, Dr. Lantz says, from the Old World reindeer, although no attempts to domesticate the American reindeer seem to have been made.

As long ago as 1851, in a paper printed in the agricultural report of the United States Commissioner of Patents, Prof. S. F. Baird expressed strongly the opinion that the American caribou of both groups were as capable of domestication as the European species, and he suggested that such a step would be of vast benefit to the Indians of the North and that success would at once place these people beyond the vicissitudes which are so rapidly sweeping them off. In the end they might become a pastoral people and possibly, in time, as agricultural as the nature of the seasons would admit. But to avoid loss of time in attempts to domesticate a wild species, Prof. Baird suggested the importation of the domesticated European reindeer.

This suggestion was made 15 years before the purchase of Alaska by the United States, and in 1887, 20 years after the purchase, Charles H. Townsend advised that the Government import the reindeer and teach the natives how to care for and to use the animals. But not until 1891 was the suggestion acted on, when the late Dr. Sheldon Jackson, general agent in Alaska of the Bureau of Education, aided by donations from private sources, purchased a small herd of European reindeer, which arrived in Alaska in 1892. Other importations were made, totaling 1,280 head. In 1907 the number had increased to 15,889, and at the present time it is estimated that the number of domesticated reindeer in Alaska is not less than 30,000 (fig. 10).

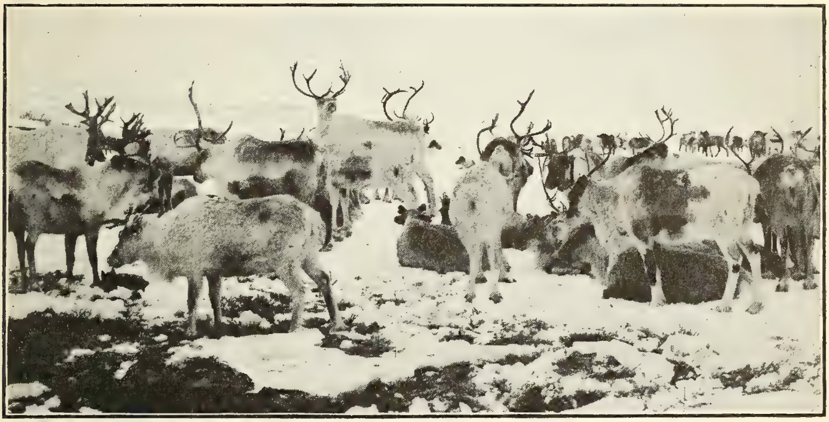

FIG. 10.—Herd of domesticated Alaskan reindeer. (Photographed by Dobbs.)

While no systematic effort has been made to test the matter, it appears that there have been instances of crossbreeding between the domesticated reindeer and the native animals, and it is thought that the blood of the wild caribou could be used to good advantage in building up the reindeer herds. There is evidently need of work along this line. It is said that with lack of care in the selection of breeding animals the domesticated deer decrease in size and otherwise degenerate. The native animals are superior in size and vigor. They are not of so wild a nature as to make their domestication impracticable and might at least be used to infuse new blood into the herds of tame deer.

It may be worth while to note in this connection that in the two northern counties of Sweden, Norrbotten and Vesterbotten, comprising 63,000 square miles, the Lapps own 230,000 reindeer. Large herds are also owned in the north of Norway and in Finland.

That portion of Alaska north of the Yukon River and the western half of the Territory is the region best suited to the reindeer, and it is also the section in which other agricultural opportunities are the most meager and conditions for home making least favorable. A development of the reindeer industry can therefore be had without encroaching on districts where other lines of farming are more feasible. The white reindeer moss (*Cladonia rangiferina*) is found in all the Arctic region of Alaska, on the Seward Peninsula and the tundras of the western portion of the Territory, and in the mountains of the Alaskan Range and of the Alaska Peninsula. Its existence not only permits the occupancy of vast regions that would otherwise be practically uninhabitable, but it makes possible the production of a food supply of large economic importance.

In the great herds of caribou (wild reindeer) that have grazed and are yet found in considerable numbers in regions north of the Yukon River, migrating from there to the mountains of the Alaskan Range and down into the Alaska Peninsula, we have a strong intimation from nature that animal husbandry is feasible in Alaska. By building on nature's foundation, a great domestic-animal industry may be established independent of what may be accomplished by introducing cattle and sheep. The reindeer subsist on the native herbage, principally the reindeer moss, winter and summer, and require no shelter and little care beyond being restrained by a herder from wandering. The meat is of excellent quality, and the skins are valuable. Little attempt has thus far been made in the Territory to use the deer for dairy or transportation purposes, as is done in Europe.

The larger proportion of the reindeer now in Alaska are within 200 miles of Nome, and nearly one-half of all are on the Seward Peninsula. From that district the herds are scattered as far north as Point Barrow, on the Arctic Ocean, south to points on the Alaska Peninsula, and eastward up the Yukon River to Tanana, which is about midway between the Canadian boundary and the west coast.

At present the individual ownership of reindeer is restricted to Eskimos and Indians, with the exception of a few Lapps who were brought in with the original importations as caretakers, instructors, and herders. Some of the missions are still in possession of herds, and there are a few Government herds. No breeding deer are allowed to be sold to whites. The Alaska division of the Bureau of Education, United States Department of the Interior, has supervision of all the herds, the teachers of the Government school for native children located nearest a herd having immediate charge. One hundred carcasses of deer were shipped to Seattle in 1911 from Nome, and the meat was sold at high prices.

Thomas A. Powers, of Unalakleet (near St. Michael), in a letter to the writer dated August 16, 1912, says the increase in number of reindeer is only one-half that of cattle, due, he thinks, to the unscientific management introduced by the Lapps and followed by the natives. He expresses an opinion that the Government should, if possible, appraise the deer held by the Lapps and missions, buy and distribute them to the natives, and then put the industry in charge of a capable American cattleman, with a corps of able assistants, who would handle it on a scientific basis.

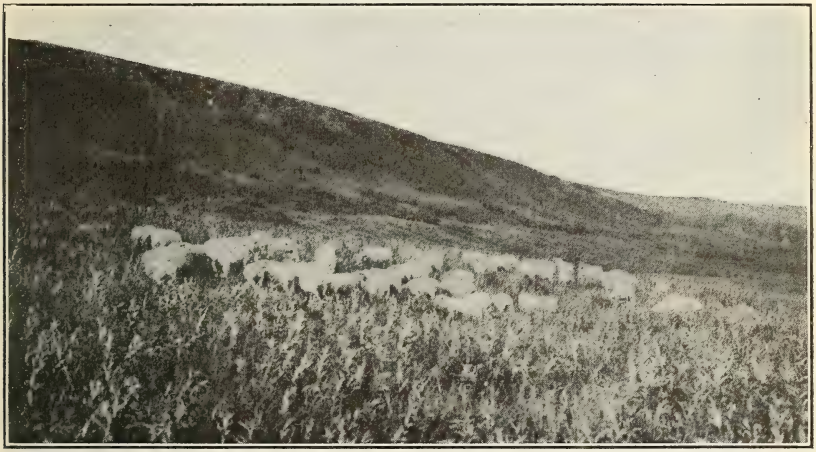

FIG. 11.—Experiment-station flock of sheep, Kodiak, Alaska, September 23, 1911.

Mr. Japhet Linderberg, president of the Pioneer Mining Co., at Nome, Alaska, a recognized authority on reindeer, says the tundra fires in destroying large areas of moss are a great menace to the reindeer industry. These fires are very extensive all through the interior, where the light precipitation and the peaty character of much of the soil of the area permit them to smoulder and burn until not only all the vegetation but much of the soil is destroyed.

CATTLE AND SHEEP RAISING.

A cattle and sheep raising industry "ties on" to the reindeer industry in southwestern Alaska. The animal-husbandry experiment station of the United States Department of Agriculture is at Kodiak on Kodiak Island (figs. 11 and 12) where a herd of Galloway cattle and a flock of sheep are maintained. Private individuals and companies are also establishing stock ranches on this and adjoining islands. Unsurpassed cattle and sheep grazing is found on these islands and on the mainland of the Aleutian Peninsula near the shore, while in the mountainous interior there is said to be good reindeer grazing ground. The desirability of establishing a reindeer herd on the southern end of Kodiak Island has been considered. Herds are already located at points on the mainland not far distant.

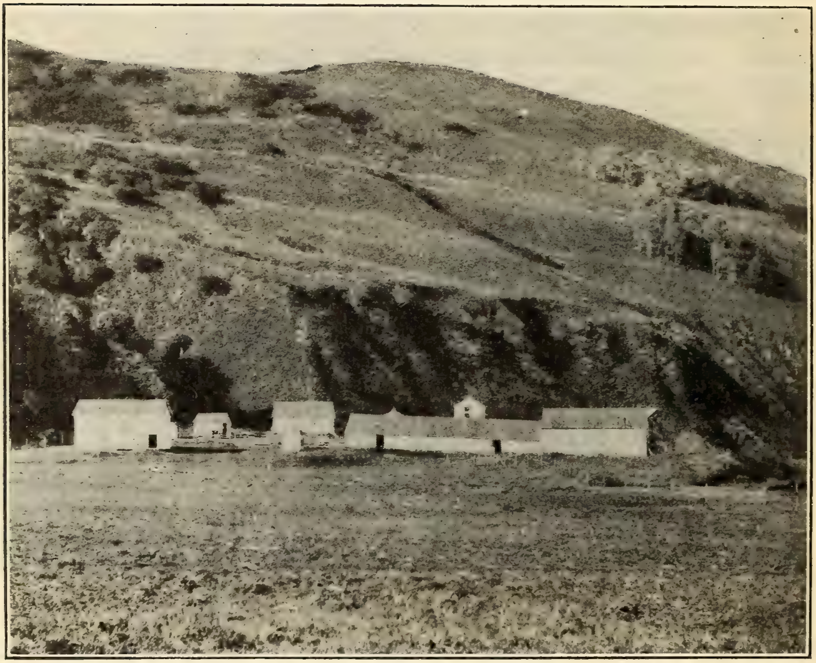

FIG. 12.—Kalsin Bay stock-breeding station of the Kodiak Agricultural Experiment Station, U. S. Department of Agriculture, 15 miles from Kodiak, September 28, 1911.

Winter forage for cattle and sheep is provided largely from the native grasses, both hay and silage being made.

The next most extensive and favorable grazing area in Alaska for domestic cattle and sheep is in the Tanana Valley, including also portions of the upper Yukon Valley and extending from the international boundary westward to the confluence of the two streams named. Other more or less favorable grazing areas are in the Copper River drainage, the Susitna drainage, on the Kenai Peninsula and in the upper valley of the Kuskokwim River. The practicability of raising stock in these areas, other than in small herds in quite close proximity to individual farms, has not been investigated with sufficient care to warrant more than an intimation of its possibilities. The long winters with very low temperatures at all points behind the mountains that front the south coast, the boggy and moss-covered condition of the greater portion of the land, the prevalence of mosquitoes and other insects that are very trying to cattle and horses, and numerous carnivorous animals are serious obstacles to the development of a larger grazing industry, other than with reindeer and (except as has been noted) in southwestern Alaska.

DIFFICULTIES THAT CONFRONT THE HOMESTEADER.

Over against the optimistic facts pertaining to this great northwestern portion of the North American Continent are others that should be remembered by those who contemplate going to Alaska for the purpose of home making, particularly farm home making.

On the south coast, where the climate is mild, tillable land is scarce, because of the proximity of the mountains to the shore line; elsewhere in Alaska the winters are long and very cold and frost-proof buildings must be provided for shelter of family and stock.

The ground freezes to a great depth and there is but a short period during which this can thaw, and the surface is covered with an accumulation of undecayed moss and other vegetable material serving as a protection to the frost and a reservoir for moisture. The frost line under natural conditions sinks but a few feet during a season, and the thawed layer is usually a morass of muck in all portions of Alaska where tillage is possible. This condition makes land travel almost out of the question during the summer until wagon roads shall have been built, and these must be largely of the corduroy type. Meantime the farm home must generally be located close to navigable water.

The swampy character of much of the surface of Alaska makes it a great breeding ground for mosquitoes and gnats, which are almost intolerable pests to both man and beast. It also makes drainage a prerequisite in order to remove the surplus water so that the land can be worked, raise the temperature of the surface soil, lower the frost line, facilitate the decay of the accumulated organic matter, and bring about chemical changes which will transform the soil from a very acid condition to one much less so. Nature requires much time for this last process.

Where the vegetable accumulations are largely moss, this must be destroyed, either by burning or by carting it from the land, for if plowed under it decays very slowly and seems to have an injurious effect on most crop plants.

The timber growth, which occurs on practically all the land suitable for tillage, must, of course, be cleared from the land.

All this work—building houses and barns, draining, clearing land of moss and timber—is very slowly accomplished in the short outdoor working season if done single handed by the homesteader, and costly, almost prohibitively so if hired labor is used, because of the high wages and living expenses.

Lack of general transportation which would open up the country, of local wagon roads, schools, churches, and other features of present-day life, and of the markets in which to sell farm products and from which to obtain home supplies and farm equipment are deterrent features at present, but they will disappear in time.

Another serious obstacle to homesteaders is the lack of Government land surveys. Under the law a man may locate a homestead on unsurveyed land and fix boundaries by metes and bounds; but he can not get a title to the land until he has had the tract surveyed at his personal expense by an authorized surveyor and has had the survey approved. This means an outlay of several hundred dollars in cash, which few homesteaders in Alaska have available. Happily, this is now being remedied by the General Land Office. Surveying parties have been at work in the Fairbanks and Cook Inlet regions, near Seward, and in the Copper River Valley sectionizing the land, and this work will be continued until all the areas where farming is feasible have been covered.

SUMMARY.

Alaska lies between latitude 51° 20′ and 71° 20′ N., and longitude 130° W. and 175° E.

Seattle is 400 miles nearer to Eastport, Me., the easternmost point of the United States, than to Attu, the extreme western point of Alaska. The meridian of longitude passing through Attu also passes through New Zealand.

The coast line is 26,000 miles long. On the south coast there are numerous deep, land-locked, ice-free harbors.

The total length of the navigable rivers is 6,000 miles. The Yukon is 1,500 miles from the mouth to the Canadian boundary and is navigable by large steamers for 500 miles above that point. It drains an area of 200,000 square miles.

Alaska has an area of 586,400 square miles, of which 100,000 square miles are susceptible of agricultural use—tillage and grazing. Probably 30,000 square miles, or 5 per cent of the total area, can be made available for tillage.

Four-fifths of the possible tillage area is in the Central Plateau, of which the Tanana Valley offers the largest opportunities for farming. The Cook Inlet region has 3,000 square miles of tillable land, the Copper River drainage 2,000 square miles, and there are 1,000 square miles on the south coast, including the southeastern and southwestern projections.

It is not to be understood that the land in these areas is of such character that every half section is a possible farm home. Excepting in the alluvial-deposit areas bordering the larger streams, the topography of the possible tillable land is hilly, and in selecting homesteads care must be taken to secure a favorable slope, so as to get the full advantage of exposure to the sun. Apart from the bottom land there are few half sections all of which may be tilled, and homesteads will not be joined one to another, as a rule, but will be separated by land unfit for farming.

Alaskan soils have been formed largely from material produced by glacial action and from alluvial deposits. Gravel beds occur frequently, and these are often thinly covered with soil. Shallow lakes and lake beds abound and in the latter the accumulation of partially decayed vegetation has been transformed into peat. Where the vegetation has fully decayed there is a rich black loam.

Because of the protecting coat of vegetation and the short melting season, the frost line in the soil lowers only a few feet during the summer, thus preventing the escape of the excess of soil moisture and, together with the low temperature, the decay of vegetation. This results in a very wet, mucky, and sour condition of the soil. Consequently, much of the land before it can be made to produce cultivated crops must be drained and cleared of the protecting coat of moss and other vegetation, in order to permit the heat of the sun to lower the frost line. Lime is very generally needed as a corrective of the acidity of the soil.

Practically all of the tillable land in Alaska must be cleared of a growth of timber and moss at heavy cost.

The climate of Alaska varies greatly. On the south coast the summers are cool and the winters mild, the mean annual temperature at Sitka being about that of Washington, D. C. Zero temperatures are the exception. Precipitation is heavy, and there is much cloudy weather that is not favorable to tillage other than the growing of vegetables and grasses. The high mountains fronting the south coast intercept the moisture-laden clouds coming from the sea and cause the excessive precipitation at low levels and the permanent snow and ice fields at the higher levels.

The central plateau, consequently, has a much drier climate and a much greater range of temperature, with warmer summers and colder winters. The summers are short as to number of days, but, with 18 to 20 hours of sunshine in each 24 hours during the growing season, vegetation develops very rapidly. The winter temperatures are very low, but with dry, still air and clear weather much of the time, particularly in the upper portion of the Yukon drainage.

The flora is rich and varied. It includes 100 species of grasses, many of which are of large agricultural value for hay and silage and for grazing. The mosses and lichens of the tundra regions of western and northern Alaska are an important source of food supply for domesticated and native reindeer.

Among the native edible fruits that are plentiful are currants, gooseberries, strawberries, cranberries, blueberries, and raspberries.

Timber in the humid south-coast area is dense and of large economic value. In the central plateau it is sparse and small, but ample for local needs if it can be conserved. Of the Coniferæ, spruce predominates. The balm of Gilead and quaking-asp poplars and white birch are the representatives of deciduous trees. Willow and alder thickets are widespread. There are 100,000 square miles that may be classed as timberland.

Among the fauna are the king of carnivorous animals, the Kodiak brown bear, and many other species of bears; the moose, the largest of his kind; the caribou or native reindeer that exist in large herds; mountain sheep and goats; deer; numerous fur-bearing land and sea animals; myriads of land and water birds, this being the nesting place of many of the latter; and fish in such variety and number as to make the fisheries of Alaska among the greatest in the world.

The mineral resources are vast, varied, and widespread. Gold, copper, and coal are of the greatest importance. Gold and coal are very widely disseminated. Rich bodies of copper ore have been located in the Prince William Sound region and in the Copper River drainage.

Alaska's agricultural possibilities have been in process of demonstration for 15 years by the Office of Experiment Stations of the United States Department of Agriculture, during which time experimental work has been carried on in Sitka (the headquarters station), Copper Center, Kenai, Kodiak, Rampart, and Fairbanks, besides the work done by individuals on homesteads, at schools, and at missions. The result of this effort has been to prove that hardy vegetables, small fruits, and forage crops can be successfully grown over a wide area and that dairying, poultry keeping, and stock raising are promising industries. There is ample pasturage in the tundra regions of western and northern Alaska for many thousands of reindeer.

Alaska's present population of 65,000, including natives, does not afford sufficient home market to warrant large agricultural development, especially in view of the great cost of clearing and preparing land for tillage.

The Federal homestead laws extend to Alaska, excepting that, instead of 160 acres, 320 may be filed upon. Very little of the available land has been surveyed, but that work is now in progress. One may locate on unsurveyed land, file a claim, and establish lines by metes and bounds, but he can not secure a title until a survey has been made by an authorized surveyor and the survey approved. If the survey is made in advance of that made by the Government, it is done at the expense of the homesteaders, and that is heavy.

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